View metadata, citation and similar papers at core.ac.uk

brought to you by CORE

provided by University of New England

University of New England
DUNE: DigitalUNE

Case Report Papers | Physical Therapy Student Papers

12-4-2014

Progressive Strengthening And Postural Training In A Patient With Leg Length Discrepancy And Anterior Pelvic Tilt In A Physical Therapy Outpatient Setting: A Case Report

Oana Butnarasu
University of New England

Follow this and additional works at: http://dune.une.edu/pt_studcrpaper

 Part of the Physical Therapy Commons

© 2014 Oana Butnarasu

Recommended Citation
Butnarasu, Oana, "Progressive Strengthening And Postural Training In A Patient With Leg Length Discrepancy And Anterior Pelvic Tilt In A Physical Therapy Outpatient Setting: A Case Report" (2014). *Case Report Papers*. 11.
http://dune.une.edu/pt_studcrpaper/11

This Course Paper is brought to you for free and open access by the Physical Therapy Student Papers at DUNE: DigitalUNE. It has been accepted for inclusion in Case Report Papers by an authorized administrator of DUNE: DigitalUNE. For more information, please contact bkenyon@une.edu.

Progressive Strengthening and Postural Training in a Patient with Leg Length Discrepancy and Anterior Pelvic Tilt in a Physical Therapy Outpatient Setting: A Case Report

Oana Butnarasu, BA, is a DPT Student at the

University of New England, 716 Stevens Ave. Portland, ME 04103

Address all Correspondence to Oana Butnarasu at: obutnarasu@une.edu

The patient signed an informed consent allowing the use of medical information for this report and received information on the institution's policies regarding the Health Insurance Portability and Accountability Act.

The author acknowledges Mike Fillyaw, PT, MS for assistance with case report conceptualization, and Tom Thoman, DPT for assistance during evaluation and treatment plan.

Abstract

Background & Purpose: Leg length discrepancy (LLD) is a frequent orthopedic problem that presents as either shortening or lengthening of one of the lower limbs. Patients with LLD often present with gait compensation pattern, scoliosis, back and/or lower extremity pain.The purpose of this case report is to describe the physical therapy management of a patient with LLD who experienced pain in the left lower extremity and a left anterior pelvic tilt.

Case Description: MT was a 15 year old male who presented to outpatient PT clinic accompanied by his mother with the chief complaint of pain in his left hip. The patient reported the onset of pain in the left hip for one year with no recollection of trauma. The examination showed impairments in muscular strength. Procedural interventions included therapeutic exercises with the focus on strengthening of bilateral lower extremities and postural re education.

Outcomes: MT's Lower Extremity Functional Scale and lower extremity muscle strength showed major improvements. Aditionally, his endurance and aerobic capacity improved as demonstrated by his ability to run on a treadmill for two miles with no pain presentation in his left hip. However, MT continue to have mild difficity with running on uneven surfaces.

Discussion: MT made improvements in muscle performance throughout his 8 week course of physical therapy. Positive factors of treatment included good family support and compliance with plan of care as well as following the home exercise program provided by the physical therapist.

Total Word Count = 2,918

Background and Purpose

Leg length discrepancy (LLD) is a common occurrence and often seen in conjunction with musculoskeletal conditions. However, much debate exists regarding the amount of leg discrepancy that might cause biomechanical imbalance during gait and running. Some research suggests that LLD between 1.0 and 2.3 cm influences gait symmetry for joint power and moment at the hip, knee and ankle joints.[1] Conversely, some research findings indicate that LLD of less than 2 cm is not likely to cause any symptoms or affect gait.[2] Furthermore, LLD is often accompanied by pelvic asymmetry, which can place unequal stress on the hip and knee joint by shifting the line of gravity away from the center of hip joint.[1,2,3] Therefore, the stress placed on the lower extremity (LE) can lead to increased muscle activity required for control of the hip joint.[3]

Currently, the conservative approach for patients that presents with LLD of at least 10 mm is to provide heel lifts to address the leg discrepancy. This approach is supported by research and has shown a decrease in lower back pain associated with LLD.[4]

The research showed that a difference greater than 1 cm might lead to difficulty in gait pattern, scoliosis, premature degenerative joint disease, lower back pain and LE pain.[5] However, there is limited research in how physical therapy interventions can benefit patients with differences in LE muscle strength secondary to LLD and pelvic asymmetry. Therefore,the purpose of this case report is to outline a 6 week physical therapy program of strengthening exercises and postural education in a patient who experienced muscle weakness and pain in the left hip secondary to LLD and pelvic asymmetry.

History

MT and his mother reviewed and granted consent to participate in this case report. The patient was a 15 year old male referred to physical therapy with a primary complaint of left hip pain. MT arrived at a physical therapy clinic with his mother who was helpful in reporting his current symptoms and answering several of the examination questions. His primary diagnosis was LLD of 1 cm with associated pain,muscle spasming, and weakness in the left leg. MT reported the onset of pain in the left hip to be one year prior to the current physical therapy episode of care. His primary care physician requested X-Ray,MRI and CT Scanogram of his pelvis and bilateral LE's. X-Ray revealed that:growth plates were preserved with no acute bony findings in the spine; the left pelvis was approximately 17 millimeters higher than the right. The MRI results showed normal soft tissues of the pelvis and hips and no joint effusion. The CT Scanogram clinical impression revealed that left leg was 1 centimeter longer than the right leg. Following the medical tests results MT was seen by an orthopedic doctor, who recommended a 1 cm heel lift for his right shoe. MT has been wearing heel lifts consistently.

At the time of initial evaluation, he lived with his mother and his sister in a one level house. Prior to experiencing pain in his left hip, MT played soccer, skiing, hiking and hunting. Since the onset of the pain, MT stopped hiking, and playing soccer. Except for the hip pain,MT was in excellent health with no other significant medical history. MT and his mother's goals included returning to playing soccer and family activities that involved running and hiking.

System Review

A systems review of the cardiovascular system revealed a resting HR of 60 beats per minute and BP of 110/80 mmHg. Visual observation of respiration rate was normal. The integumentary system was not impaired. His height was 4'11", and his weight 100 lbs. He appeared to have a thin appearance. For the musculoskeletal system, he demonstrated normal range of motion (ROM) of the lumbar spine,bilateral hip, knee, and ankle joints. Manual break testing revealed weakness in the left hip compared to the right hip. Results of systems review are listed in Table 1.

Clinical Impression 1

MT presented with musculoskeletal impairments that would need to be addressed through physical therapy. It was hypothesized that the hip pain might be caused by hip pathology such as: hip labrum tear, avascular necrosis, and hip impingement, therefore further investigation was warranted. Furthermore, sacroiliac dysfunction was a second hypothesis that was considered due to patient symptoms. MT was a good candidate for a case report because he presented with muscle strength deficits in his LE and pain coupled with LLD and pelvic asymmetry. This case created the prospect to document the implementation of progressive strengthening exercises and postural education of a patient that presented with muscle weakness and pain in the left hip, secondary to LLD and pelvic asymmetry.

Tests and Measures

Visual observation of standing posture revealed normal alignment. Gait pattern: patient presented with a mild toe out pattern during ambulation. DTR's and light sensation of bilateral lower extremity was unimpaired. Evaluation of shoe wear was performed, and no noticeable

wear and tear differences was noticed. Palpation of the pelvis landmarks bilateral iliac crests, anterior superior iliac spine (ASIS), posterior superior iliac spine (PSIS) was performed. Based on the findings performed during palpation, bilateral LE length measurements were performed and recorded. Because MT reported pain in the left hip, screening for hip pathology was performed in order to accept or refute the differential diagnosis for hip pathology. Special tests such as: Scour test and Faber test were administered because it has been shown to be a reliable tool in assessing for hip labrum, capsulitis osteochondral defects, acetabular defects, osteoarthritis, avascular necrosis and femoral acetabular impingement syndrome.[6,7] Further investigation lead to hypothesis of sacroiliac dysfunction, for which Gillet 's and Supine-to-sit tests were administered. The results of these tests were positive which indicated sacroiliac dysfunction. Although Gillet's and Supine-to-sit tests have a low reliability in assessing sacroiliac dysfunction in patients with hip pain nor in patient with low back pain, they are commonly used in clinical setting in conjunction with standing forward-flexion and sitting forward-flexion test to assess pelvis asymmetry.[8] Based on the results of Gillet's test and supine-to-sit tests, further investigation was performed by palpating ASIS, PSIS and iliac crest in standing and supine position in order to approve or dismiss the hypothesis of pelvic asymmetry. The findings yielded an anterior pelvic tilt on the left.The Weber-Barstow maneuver test was administered because it has been shown to be a reliable tool in assessing LLD,[8] which lead to performing measurements of LE length using a standard tape measure. Three different bony landmarks were used: navel to medial malleolus and ASIS to medial malleolus in order to assure the accuracy of the information obtained. Moreover, based on the positive results of Gillet and supine-to-sit tests, muscle tightness was assessed via Thomas test.

The Lower Extremity Functional Scale (LEFS) was administered because it has been shown to be reliable in assessing function in a wide variety of patients with LE orthopedic conditions.[9] The initial score of LEFS was 60/80, and after 6 weeks of therapy, MT achieved a score of 73/80. The LEFS is an appropriate outcome measure for this case because it measures function and activity limitations for patients with musculoskeletal disorders. Results of examination are listed in Table 2.

Muscle Performance

Due to the length of time since the initial onset of pain and the decrease in activity level, manual muscle testing (MMT) of MT's LE was performed. MMT was performed in accordance to the technique described by Kendall et all.[10] Left hip strength was found to be impaired compared to the right hip strength. Results for muscle performance are listed in Table 3.

Pain

Pain assessment was performed using 0 to 10 verbal numeric pain rating scale, with 0 no pain and 10 as the worst pain. MT complained of left hip pain of 5/10 with activities such as hiking, running and playing soccer. He reported 0/10 pain at rest.

Clinical Impression 2

Evaluation

MT's primary impairments were decreased muscle strength and pain in the left hip. The information obtained in the examination such as leg length measurements using different bony landmarks were consistent with CT Scanogram results. In addition, the test and measures revealed a left pelvic anterior tilt. This finding was confirmed by X Ray results which indicated a

pelvic tilt with the left pelvis being 17 millimeters higher than the right. The hip pathology hypothesis was refuted based on the tests performed, while the sacroiliac dysfunction was neither accepted nor refuted due to the limited reliability of the tests used. Therefore, it was concluded based on the findings during evaluation and the imaging results that the patient's pain and muscle weakness was a result of LLD and pelvis asymmetry, which lead to decreased in physical activity.

Based on the examination, MT had impairments which required physical therapy treatment. The focus of the interventions provided during this episode of care was to address MT's goals of returning to playing soccer and participate in family activities and to address the muscle weakness in left LE and pelvis asymmetry.

Physical Therapy Diagnosis

The primary PT diagnosis was practice pattern 4C: Impaired Muscle Performance. This decision was based on the findings of impaired muscle performance.

Prognosis

Based on his overall excellent health status combined with his high motivation to return to playing soccer, and participate in family activities, MT has a good potential for improvement in terms of muscle strength in the LE. Positive prognosis factors include the fact that he had a good family support, he was young and highly motivated. Research has demonstrated that many patients who present with a leg length inequality of 10 mm or less who wear heel inserts reduced their hip and lower back pain.[4] Therefore, his prognosis to return to his prior level of function is good based on his physical health status and his compliance with wearing heel lifts.

Plan of Care

Based on the MT's examination findings, consultation with PCP was performed in order to obtain the X-Ray, MRI and CT scan results.In addition, this episode of care was closely coordinated with MT, MT's mother and the supervising Clinical Instructor. Based on the evaluation findings and upon consulting with MT's mother, the plan was to treat MT in physical therapy for at least 6 weeks. Procedural interventions for MT focused on therapeutic exercise including strength training, postural reeducation and patient education. Physical therapy goals were centered on improving muscle strength in the left hip and decrease pelvic asymmetry. Physical therapy goals are listed in Table 4.

Interventions

Coordination, Communication, Documentation

The episode of care for MT was coordinated with patient and his mother. Communication with MT's PCP was performed in order to receive the results of his MRI,CT scan and X – Ray.Additionally, communication with the Clinical Instructor was performed at initial evaluation and throughout the episode of care. Documentation consisted of evaluation, daily notes and discharge note.

Client and Family Education

Client related instruction focused on the his current condition and the rationale for therapy progression. Based on the discussion with MT and his mother regarding the findings during the physical therapy evaluation and the imaging results it was evident that they required education regarding his current condition. It was used a skeletal model in the clinic to show the pelvic position and the connection to the hip, knee and ankle joints.In addition, they were

provided with education regarding growth spurts specific for his age. Furthermore, the family was educated on the possible consequences of LLD that could lead to scoliosis, low back pain, and stress fractures. It was emphasized that MT continue to wear the heel lifts on a daily bases in order to facilitate a proper alignment of the pelvis.[4] Education was provided on therapeutic exercises and Home Exercise Program (HEP).

Procedural Interventions

MT was scheduled for PT two times per week for one hour for a duration of six weeks. However, due to MT's mother's work schedule,after four weeks of therapy the number of visits per week decreased to one time,which extended the episode of care to eight weeks. Procedural interventions were focused on therapeutic exercise in the area of strength, power, endurance training, manual therapy (muscle energy) and postural education. Procedural interventions are listed in Table 5.

Aerobic Capacity/Endurance training

Aerobic capacity interventions were an important part of MT's episode of care because he stopped running and playing sports for one year prior to physical therapy. Exercises performed during his physical therapy appointments included brisk walking initially, and running on a treadmill later, as a warm-up and to improve endurance. The progression was based on fatigue level and monitoring pain using the visual analog pain scale. Studies have shown that endurance training resulted in improvements in VO2max, cardiovascular system and improved exercise economy.[11] Exercises were followed by stretching of bilateral hip flexors, which was performed during every PT session and included in HEP.

Strength and Power for Lower Extremity Muscles

Because MT presented with decreased muscle performance in the left hip muscle groups, resistance training was an important piece of intervention for MT. Initially, his strengthening program included open chain hip exercises in sidelying and supine positions with thera bands (TB), and then in standing with ankle weights. TB progression was based on the amount of resistance offered from light to moderate to heavy, which corresponded to the colors: yellow, red, and green. As his hip strength and endurance improved, the transition was made to include closed chain functional exercises such as squats, lunges, side stepping jumps, and forward jump stepping. The rationale for progression to increase exercise load was based on patient fatigue level and the decrease in difficulty while performing the exercises. The progression of strengthening exercises was based on Kisner and Colby[12] guidelines for progression of therapeutic exercises in order to improve muscle strength.

Manual Therapy

Muscle Energy Technique (MET) focused on pelvic alignment and decreasing hip pain.[13] Fryer reported that MET techniques may influence pelvis alignment and functional asymmetry indirectly through myofacial tissue contraction.[14] The technigue was initiated with the therapist providing a light resistance while the patient provided low-force isometric contraction in a supine pain-free position. MT demonstrated understanding of the therapist's verbal instructions. The combination of MET and strengthening exercises had been showen to decrease low back pain.[15] Even though MT did not present with low back pain, strengthening exercises and MET might have contributed to the decrease in pain level of his left hip.

Postural Restoration

Postural restoration aims at promoting optimal posture and neuromuscular control of the pelvic floor, diaphragm and deep abdominal muscles.[16] The reason for including this intervention plan was to provide neuromuscular stabilization to his lumbar-pelvic area in conjuction with co-activation of deep abdominals. Emphasis was placed on activating the left part of the diaphragm to pull the left ribs down and promote right apical expansion.[16]The exercise was demonstrated to the patient by the therapist and he was provided written instructions on the technique. (Figure 1). This exercises was followed by wall hip shift with foot tap in order to decrease anterior pelvic rotation on the left and facilitate corrective alignment. (Figure 2)Although, the postural restoration approach lacked evidence, it was suggested by the physical therapist consulted during this case, who reported success with this technique based on his clinical experience.

Outcomes

The assessment of outcome measures was made by two therapists. MT met or exceeded the established PT goals with 0/10 pain level in his left hip and improving LEFS score. His endurance and fatigue levels improved throughout physical therapy as he was able to run for 2 miles on the treadmill with no complaints of pain in the left hip or fatigue. Although he did improve LEFS score from 60/80 to 73/80, he reported a little bit of difficulty with performing heavy activites around the home and running on uneven surface. MT improved left hip muscle strength and at discharge both hips had equal strength.

Discussion

MT made good progress over the eight week course of PT as he demonstrated improvement in all areas of assessment. The focus of interventions on muscle strengthening, endurance training, manual therapy and postural education was appropriate due to MT's impairments in muscle performance and alignment. MT and his mother were pleased with his improvements throughout therapy and reported that he was able to participate in all family activites including hiking and running.

Further interpretation of the LEFS scores is necessary to understand the 16% difference in the final scores obtained at initial examination and discharge. A 2 point increase has been recorded on the following items:running on even surface, making sharp turns while running and walking 2 blocks. A 1 point increase has been recorded on the following items: housework/ school activites, recreational or sporting activites, standing for 1 hour, hopping, running on uneven surfaces. These differences reflect the patient's progress achieved during the current physical therapy episode of care and indicates areas that could benefit from further physical therapy interventions.

Factors that contributed to MT's positive outcomes during therapy included compliance with wearing his heel lift, attending physical therapy, good family support, and young age. The goal in introducing postural restoration exercises to MT's intervention plan was to incorporate a new approach in addressing anterior pelvic tilt. Due to the limited conclusive evidence on this type of intervention in patients with anterior pelvic tilt and hip pain, further research regarding the effectiveness and applicability is necessary. Although, the final outcome was positive for the

patient, it is unknown at the time how much contribution the heel lifts or the physical therapy interventions contributed to decreased left hip pain.

References:

1. Seeley MK, Umberg BR, Clasey JL, Shapiro R. The relationship between leg-length inequality and able bodies gait asymmetry. *J Sports Sci Med* 2010; 9. 572-579.
2. Knutson GA. Anatomic and functional leg-length inequality: A review and recommendation for clinical decision-making. Part I, anatomic leg-length inequality: prevalence, magnitude, effects and clinical significance. *Chiropr Ostoepat*. 2005; 13:11.
3. McCaw ST, Bates BD. Biomechanical implication of mild leg inequality. *J Sp Med* 1991;25(1). 10-13.
4. Ranheer Shailam, Diego Jaramillo, J. Herman Kan. Growth arrest and leg-length discrepancy. *Pediatr Radiol* (2013) 43 (Suppl 1):S155-S165
5. Friberg, O. Clinical Symptoms and Biomechanics of Lumbar Spine and Hip Joint in Leg Length Inequality. *Spine*. 1983; 8(6): 643-651
6. Martin RL, Sekiya JK. The Interrater Reliability of 4 Clinical Tests used to Assess Individuals with Musculoskeletal Hip Pain. *J Orthop Sports Phys Ther.* 2008; 38(2): A71-A82
7. Cliborne AV, Waineer RS, Rhon DI, et al: Clinical hip tests and a functional squat test in patients with knee osteoarthritis: reliability, prevalence of positive test findings, and short-term response to hip mobilization, *J Orthop Sports Phys Ther.* 2004; (34):676-685.
8. Levangie PK. Four clinical tests of sacroiliac joint dysfunction: the association of test results with innominate torsion among patients with and without back pain. *Phys Ther*. 1999 ; 79(11):1043-57.

9. Binkley JM, Stratford PW, Lott SA, Riddle DA. The lower extremity functional scale (LEFS): Scale Development, Measurment Properties, and Clinical Application. *Phys Ther.* 1999; 79: 371-383

10. Kendall FP, McCreary EK, Provance PG, Rodgers MM, Romani WA. Muscle Testing and Function with Posture and Pain. Fifth Edition. Lippincott Williams, 2005.

11. Jones A. M., Carter H. The effects of endurance training on parameters of aerobic fitness. *Sports Medicine* 2000 ; 29(6) 373-386

12. Kisner C, Colby LA. Therapeutic Exercise Foundations and Techniques. Sixth Edition. F.A. Davis Company, 2007: 173

13. Selkow, NM, Grindstaff TL, Cross KM, Pugh K, Hertel J, Saliba S. Short-Term Effect of Muscle Energy Technique on Pain in Individuals with Non-Specific Lumbopelvic Pain: A Pilot Study. *J Man Manipulation Ther*. 2009; 17(1): E14-E18

14. Fryer G. Muscle Energy technique: an Evidence –informed Approach. *Int J Osteopath Med*.2011; 14(1): 3-9

15. Wilson CE, Payton O, Donegan-Shoaf L, Dec K. Muscle Energy Technique in Patients with Acute Low Back Pain: A Pilot Clinical Study. *J Orthop Sports Phys Ther*. September 2003; 33 (9):501-512

16. Boyle KL, Olinick J, Lewis C. The Value of Blowing up a Ballon. *N Am J Sports Phys Ther.* 2010*;* 5(3): 179-188

Table 1: Systems Review

Cardiovascular **Pulmonary**	Not Impaired	
Blood Pressure	110/80mmHg	
Heart Rate	60 bpm	
	Height:4’11’’ Weight:100 lbs	
Integumentary System	Not Impaired	
Musculoskeletal		
	Right Lower Extremity	Left Lower Extremity
Gross Range of Motion	Not Impaired	Not Impaired
Gross Strength	Not Impaired	Impaired
Neuromuscular		
Balance	Not Impaired	
Communication, Affect, and Learning style	Not Impaired	

Table 2: Tests and Measures

<table>
<tr><th></th><th>Admission</th><th>Discharge</th></tr>
<tr><td>Pelvic Alignment</td><td>Standing -> L ASIS lower than R ASIS
L PSIS higher than R PSIS</td><td>Standing -> L ASIS lower than R ASIS
L PSIS higher than R PSIS</td></tr>
<tr><td>Leg Length

(ASIS to medial malleollus)</td><td>L: 82 cm
R: 81 cm</td><td>L: 82 cm
R: 81 cm</td></tr>
<tr><td>Leg Length

(Navel to medial malleolus)</td><td>L leg length: 87 cm
R leg length: 86 cm</td><td>L leg length: 87 cm
R leg length: 86 cm</td></tr>
<tr><td>Manual Muscle Testing</td><td><table><tr><td></td><td>Left</td><td>Right</td></tr><tr><td>Hip</td><td>Flexion4/5</td><td>Flexion 5/5</td></tr><tr><td></td><td>Extension 4/5</td><td>Extension 4/5</td></tr><tr><td></td><td>Abduction 4/5</td><td>Abduction 5/5</td></tr><tr><td></td><td>Adduction 5/5</td><td>Adduction5/5</td></tr><tr><td></td><td>IR/ER 4-/5</td><td>IR/ER 4+/5</td></tr><tr><td>Ankle</td><td>DF/PF 4+/5</td><td>DF/PF 4+/5</td></tr></table></td><td><table><tr><td></td><td>Left</td><td>Right</td></tr><tr><td>Hip</td><td>Flexion5/5</td><td>Flexion 5/5</td></tr><tr><td></td><td>Extension 5/5</td><td>Extension 4/5</td></tr><tr><td></td><td>Abduction 5/5</td><td>Abduction 5/5</td></tr><tr><td></td><td>Adduction 5/5</td><td>Adduction5/5</td></tr><tr><td></td><td>IR/ER 4+/5</td><td>IR/ER 4+/5</td></tr><tr><td>Ankle</td><td>DF/PF 5/5</td><td>DF/PF 5/5</td></tr></table></td></tr>
<tr><td>Special Tests</td><td>Thomas test (+) on the L/R
Gillet’s Test (+)
Faber Test (-)
Scour test (-)
Supine –to-sit Test (+)
Weber-Barstow maneuver (+)
Toe touching test</td><td>Thomas Test (-) on L/R
Gillet’s test (+)
Faber (-)
Supine to sit Test (+)</td></tr>
<tr><td>Pain</td><td>VAS: 5/10 L LE</td><td>VAS: 0/10 L LE</td></tr>
<tr><td>LEFS</td><td>60/80</td><td>73/80</td></tr>
</table>

L= left; R= Right; ASIS=Anterior Superior Iliac Spine; PSIS= Posterior Superior Iliac Spine
LEFS=Lower Extremity Functional Scale
VAS= Visual Analog Scale

Table 3:Goals

Goals	
Short Term Goal	Patient will report decrease in pain level of the left hip to 0/10 from 5/10 and increase left hip strength to equal the contralateral side in order to participate in the rehabilitation program and increase participation in recreational activities.
Short Term Goal	Patient will increase muscle strength in left hip to 5/5 from 4/5 and decrease left hip tightness in the hip flexors and extensors to facilitate running on even/uneven surfaces for 1 mile and walking for 2 miles.
Long Term Goal	Patient will be able to run for 2 miles outdoors/treadmill and demonstrate ability to play soccer and hike with his family without pain in left hip.
Long Term Goal	Patient will return to playing soccer, hike, hopping and participate in family activities without pain in left hip, and he will improve scores on LEFS.

Table 4: Procedural Interventions

Week 1	Week 2	Week 3	Week 4	Week 5+6	Week 7+8
Treadmill: 0.25 miles	Treadmill: 0.25 miles	Treadmill:0.50 miles	Treadmill:0.50 miles	Treadmill: 1 mile	Treadmill: 2 miles
Stretching L/R hip flexors 3X30 sec	Stretching L/R hip flexors 3X30 sec	Stretching L/R hip flexors 3X30 sec	Stretching L/R hip flexors 3X30 sec	Stretching L/R hip flexors 3X30 sec	Stretching L/R hip flexors 3X30 sec
Clamshell YTB 3X10	Clamshell YTB 3X10	Clamshell RTB 3X10	Clamshell RTB 3X10	Clamshell GTB 3X10	Muscle Energy 3 X L/R hips
Standing hip Extension YTB 3X10	Standing hip Extension YTB 3X10	Standing hip extension RTB 3X10	Standing hip extension RTB 3X10	Standing hip extension RTB 3X10	PRI Exs 90-90 lift with a ball
L SLR with 2lbs weights 3X10	L SLR with 2lbs weights 3X10	L SLR with 3 lbs weights 3X10	L SLR with 3 lbs weights 3X10	L SLR with 4 lbs weights 3X10	Jumping jacks 3X10
L/R IR/ER YTB 3X10	L/R IR/ER YTB 3X10	L/R IR/ER RTB 3X10	L/R IR/ER RTB 3X10	L/R IR/ER GTB 3X10	Side stepping jumps on a 6 inch step 3X12
Toe/heel raises 3X10	Toe/heel raises 3X10	Squats/Lunges 3X10	Squats/Lunges 3X10	Squats/Lunges with 10 lbs kettlebell 3X10	Forward jump stepping on a 6 inch step 3X12
Muscle Energy 3 X L/R hips	Muscle Energy 3 X L/R hips	Muscle Energy 3 X L/R hips	Muscle Energy 3 X L/R hips	Muscle Energy 3X L/R hips	
PRI Exs 90-90 lift with ball	PRI Exs 90-90 lift with ball	PRI Exs 90-90 lift with ball	PRI Exs 90-90 lift with ball	PRI Exs 90-90 lift with a ball	

L= left hip, R= right hip, YTB= yellow tera band, RTB=red tera band, GTB= green tera band, SLR=straight leg raise, PRI Exs=postural restoration institute exercises

	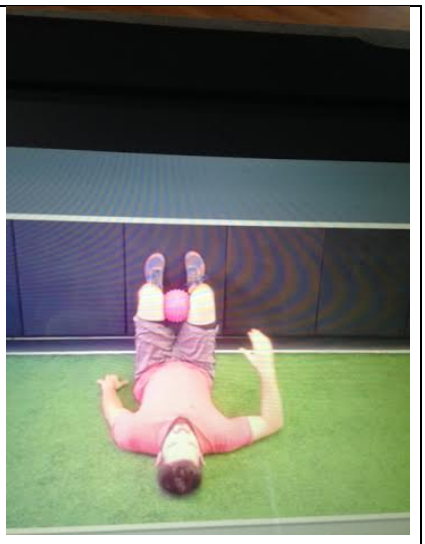
Lie on your back with your feet on a wall with your knees bent at 90-degrees. Place a small towel or ball that is roughly 6” in between your legs. Place your right arm over your head as flat to the ground as you can make it. Inhale through your nose and exhale through your mouth lifting your tailbone off the floor as your exhale. Push your right knee slightly higher than your left without taking your feet off the wall. Act as if you are trying to slide your left foot down the wall again without moving it (you should feel your left hamstring tighten up). Hold this position while you take 4-5 deep breaths. Follow the pattern of inhaling through your nose and exhaling out your mouth. Exhale forcefully: the more so, the better. . Relax and repeat four times.	Lie on your back with your feet on a wall with your knees bent at 90-degrees. Hold the ball between your legs while you tap gently the wall with the right foot for 10 times. . Relax and repeat four times

Figure 1: 90/90 hip lift & Wall Hip Shift with Foot Tap
Representation of the same exercises provided to MT
Source: http://www.everydayafs.com/learn-proper-breathing-patterns-learn-lift/

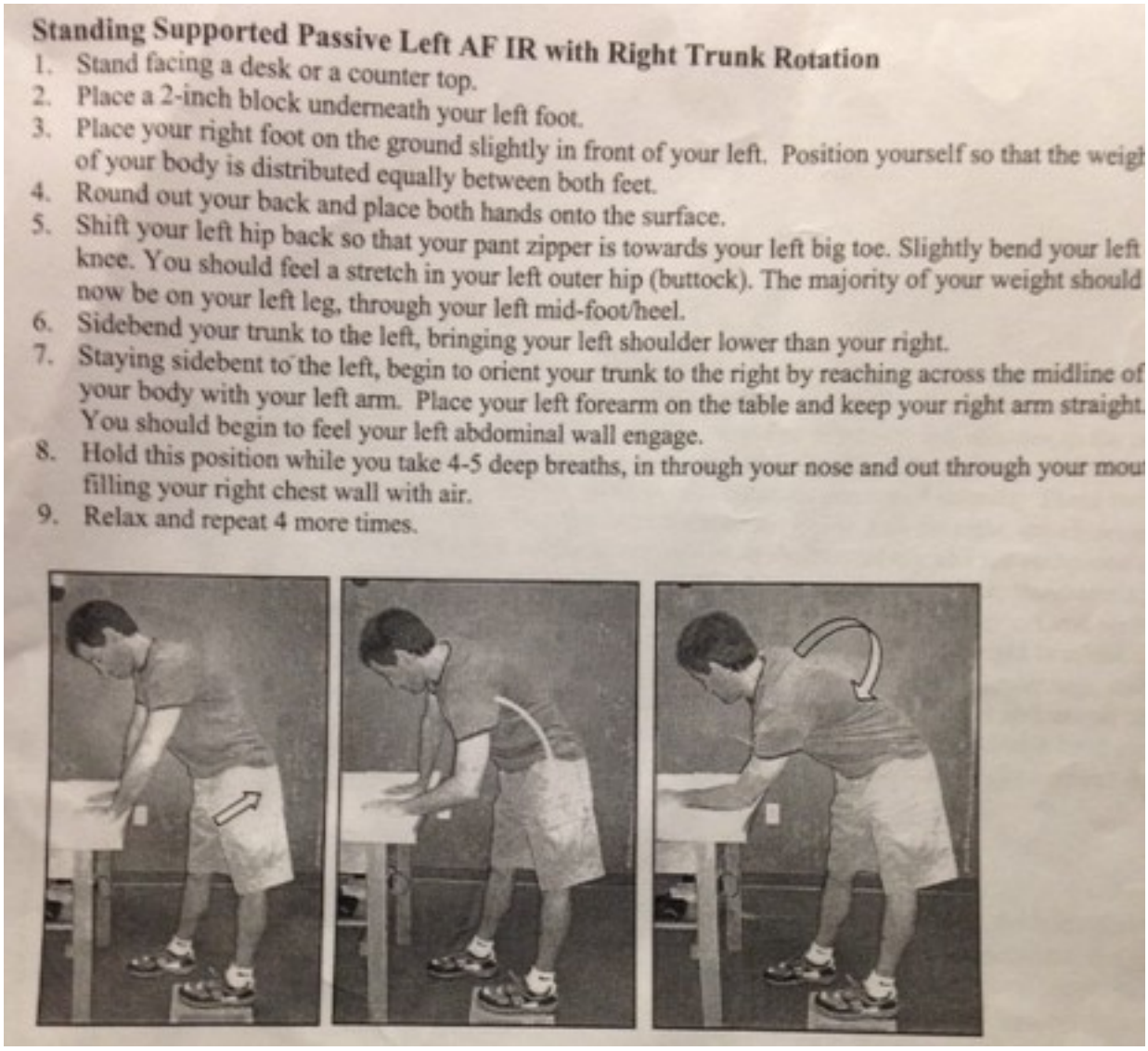

Figure 2: Standing Supported Passive Left AF IR with Right Trunk Rotation
Representation of the same exercises provided to MT
Source: Postural Restoration-An Integrated Approach to Treatment of Patterned Thoraco-Abdominal Pathomechanics

Appendix 1. Lower Extremity Functional Scale

We are interested in knowing whether you are having any difficulty at all with the activities listed below because of your lower limb problem for which you are currently seeking attention. Please provide an answer for **each** activity.

Today, do you or would you have any difficulty at all with:

(Circle one number on each line)

Activities	Extreme Difficulty or Unable to Perform Activity	Quite a Bit of Difficulty	Moderate Difficulty	A Little Bit of Difficulty	No Difficulty
a. Any of your usual work, housework, or school activities.	0	1	2	3	4
b. Your usual hobbies, recreational or sporting activities.	0	1	2	3	4
c. Getting into or out of the bath.	0	1	2	3	4
d. Walking between rooms.	0	1	2	3	4
e. Putting on your shoes or socks.	0	1	2	3	4
f. Squatting.	0	1	2	3	4
g. Lifting an object, like a bag of groceries from the floor.	0	1	2	3	4
h. Performing light activities around your home.	0	1	2	3	4
i. Performing heavy activities around your home.	0	1	2	3	4
j. Getting into or out of a car.	0	1	2	3	4
k. Walking 2 blocks.	0	1	2	3	4
l. Walking a mile.	0	1	2	3	4
m. Going up or down 10 stairs (about 1 flight of stairs).	0	1	2	3	4
n. Standing for 1 hour.	0	1	2	3	4
o. Sitting for 1 hour.	0	1	2	3	4
p. Running on even ground.	0	1	2	3	4
q. Running on uneven ground.	0	1	2	3	4
r. Making sharp turns while running fast.	0	1	2	3	4
s. Hopping.	0	1	2	3	4
t. Rolling over in bed.	0	1	2	3	4
Column Totals:					

SCORE: _____/80

Error (single measure): ±5 scale points
MDC: 9 scale points
MCID: 9 scale points

389

390

391